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A Page Out of History

Edouard Branly Inventor of The First Detector

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Ask any radio amateur whether his or her receiving system (whatever the mode of communication) includes a detector and the answer will be "Of course!" Ask what kind of detector it is, and the answer probably will be "product detector," or possibly "limiter/discriminator." If the amateur collects old radios, the answer may be "6AL5" —a vacuum tube dual diode.

Now ask your amateur friend what a *coherer* is. The almost universal response will be "A what??"

The coherer was, in fact, the earliest effective detector in the days of spark. Invented around 1890 by Edouard Branly, it changed wireless waves from an interesting phenomenon to a means of communicating intelligence. Experimenters, from Hertz on, learned how to generate electromagnetic waves, detect their presence, measure them, direct them, investigate their characteristics. But until Branly's coherer, they had no means of using the waves to spell out messages. Guglielmo Marconi, in his first transmission from England to France in 1899, sent a message to Branly paying his "respectful compliments by wireless telegraphy" and stating that "this splendid achievement is due in part to the remarkable work of M. Branly."

The coherer was a simple gadget which did big things. Basically, it was a glass tube with metal plugs at the ends. The space between the plugs was loosely packed with metal particles. Iron filings were used, and later nickel dust. When an electrical spark was produced at a moderate distance, the particles stuck together, increasing the conductivity of the device.

A tap on the tube separated the filings, and the current through the gap dropped to zero and the tube was ready to "hear" the next spark. A later refinement added an automatic "tapper" which struck the tube after each signal so that the coherer could receive Morse, although very slowly. For a time it was not understood that Hertzian waves were producing the cohering effect. Branly himself thought that it was the light from the spark which was responsible. No less a scientist than Sir Oliver Lodge, in a 1874 lecture he proved that the tube was actually detecting Hertzian waves, and he named the device a "coherer" because it made the signals "coherent."

Marconi made countless experiments to improve the tapping "decoherer" and substituted a Morse printer for the voltmeter usually employed to indicate that signals were present. Since the current available from the coherer was too weak to drive the Morse machine, Marconi added a battery, making the coherer, in effect, a relay.

Like many devices of that era, the coherer was discovered in part by accident. However, accidents of this nature usually happen only to people who are well prepared and ready to recognize them.

Edouard Branly was born in 1844 in Amiens, France. His father was on the faculty of the Lyceum de St. Quentin; young Edouard studied there and at the Ecole Normal Superieure in Paris. A brilliant student, he went on to the famed Sorbonne, where he received his doctorate in physics and was given a position in the physics laboratory. Later he was appointed a professor and research physicist at the Institut Catholique, a denominational university in Paris.

In a career move that had overtones in today's world, Branly, already in middle age, realizing that the salary of a researcher was inadequate for his needs, decided to study medicine and become a physician. His income as a doctor enabled him to engage in his own scientific experiments, which occupied the next quarter-century.

Branly's medical studies led directly to his invention of the coherer. While investigating the manner in which nerves carry messages to and from the brain, he observed that nerves are not continuous fibers. Rather, they are composed of neurons packed closely but not necessarily in direct contact. Branly tucked this bit of information aside for future reference in his work with electromagnetic waves, and later he used this model for his coherer.

The action of the coherer had been observed but not understood at least 30 years before Branly. In 1830 a Frenchman named Guitard observed that dust formed strings and clumps when the air was electrified, but it meant nothing to him. About 15 years later S.A. Varley devised a lightning protector for telegraph lines which used carbon dust in a tube. It very likely was connected between the line and ground, and when a lightning stroke occurred nearby, the carbon granules coalesced, conducting the voltage induced on the line to ground.

An Italian, Calzecchi Onesti, did some really serious work on the subject, publishing his results in a scientific journal in 1884. Indeed, there have been references to the "Onesti-Branly coherer."

When Marconi needed a device to translate sparks into readable Morse, the coherer was ready for him. It was crude and it was slow, and it represented only the beginning in the search for devices to "detect" radio signals. However, it was the first.

Branly died in 1940 at the advanced age of 95, angry that radio, which he had so great a part in making possible, had become an instrument of propaganda in the developing European war. CQ

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